

**SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION**

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## APPENDICES

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**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

# ***ROADWAY SUBSURFACE INVESTIGATION***

COUNTY **FORSYTH**  
PROJECT DESCRIPTION **REPLACE BRIDGE NO. 95**  
**OVER BLANKET CREEK ON SR 1100**

## ***INVENTORY***

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5152	1	6

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE USED ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE SELECTED WATER LEVELS AND MOISTURE CONDITIONS ARE BASED ON THE SUBSURFACE INVESTIGATIONS AS ARE RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED THAT THE SUBSURFACE INVESTIGATIONS ARE CONDUCTED AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

*J. K. STICKNEY*

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*C. L. SMITH*

R. M. MOORE

INVESTIGATED BY J. E. BEVERLY

DRAWN BY W. D. FIELDS

CHECKED BY J. E. BEVERLY

SUBMITTED BY K. B. MILLERDATE SEPTEMBER, 2016

DocuSigned by:

—957A789AED704CB...

9/13/2016

SIGNATURE

DATE \_\_\_\_\_

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

**REFERENCE: B-5152**

**PROJECT: 42313**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION												GRADATION												ROCK DESCRIPTION												TERMS AND DEFINITIONS											
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>												WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.												HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:												ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.											
SOIL LEGEND AND AASHTO CLASSIFICATION												ANGULARITY OF GRAINS												WEATHERED ROCK (WR)												CRISTALLINE ROCK (CR)											
GENERAL CLASS.		GRANULAR MATERIALS ( ≤ 35% PASSING #200)						SILT-CLAY MATERIALS ( > 35% PASSING #200)						ORGANIC MATERIALS				FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																													
GROUP CLASS.	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																															
SYMBOL												NON-CRYSTALLINE ROCK (NCR)												COASTAL PLAIN SEDIMENTARY ROCK (CP)																							
% PASSING #10 #40 #200												SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE												WEATHERING																							
MATERIAL PASSING #40 LL PI												PERCENTAGE OF MATERIAL												FRESH																							
GROUP INDEX												GROUND WATER												VERY SLIGHT (V SL.)																							
USUAL TYPES OF MAJOR MATERIALS												MISCELLANEOUS SYMBOLS												MODERATE (MOD.)																							
GEN. RATING AS SUBGRADE												RECOMMENDATION SYMBOLS												MODERATELY SEVERE (MOD. SEV.)																							
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30												ABBREVIATIONS												SEVERE (SEV.)																							
CONSISTENCY OR DENSENESS												EQUIPMENT USED ON SUBJECT PROJECT												COMPLETE																							
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)				RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )				ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.																																			
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)		VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		< 4 4 TO 10 10 TO 30 30 TO 50				N/A				ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</i>																																			
GENERALLY SILT-CLAY MATERIAL (COHESIVE)		VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30				< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4				ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i>																																			
TEXTURE OR GRAIN SIZE												ROCK HARDNESS																																			
U.S. STD. SIEVE SIZE OPENING (MM)		4 4.76		10 2.00		40 0.42		60 0.25		200 0.075		270 0.053		VERY HARD																																	
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE. SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)		HARD																																	
GRAIN SIZE		305 12		75 3		2.0		0.25		0.05		0.005		MODERATELY HARD																																	
SOIL MOISTURE - CORRELATION OF TERMS												ROCK QUALITY DESIGNATION (RQD)																																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION								SOFT																																			
LL		LIQUID LIMIT		- SATURATED - (SAT.)				USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE				MEDIUM HARD																																			
PLASTIC RANGE (PI)		PLASTIC LIMIT		- WET - (W)				SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE				VERY SOFT																																			
OM		OPTIMUM MOISTURE		- MOIST - (M)				SOLID; AT OR NEAR OPTIMUM MOISTURE				FRIABLE																																			
SL		SHRINKAGE LIMIT		- DRY - (D)				REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				MODERATELY INDURATED																																			
PLASTICITY												INDURATION																																			
NON PLASTIC		SLIGHTLY PLASTIC		MODERATELY PLASTIC		HIGHLY PLASTIC		PLASTICITY INDEX (PI)				DRY STRENGTH				INDURATED																															
COLOR												EXTREMELY INDURATED																																			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.												BENCH MARK:																																			
												ELEVATION: FEET																																			
												NOTES:																																			
												FIAD - FILLED IN AFTER DRILLING																																			
												PROJECT WAS DRAFTED USING NCDOT PROVIDED TIN FILE FILE: B5I52-Ls.tin (DATED 05/17/2016)																																			

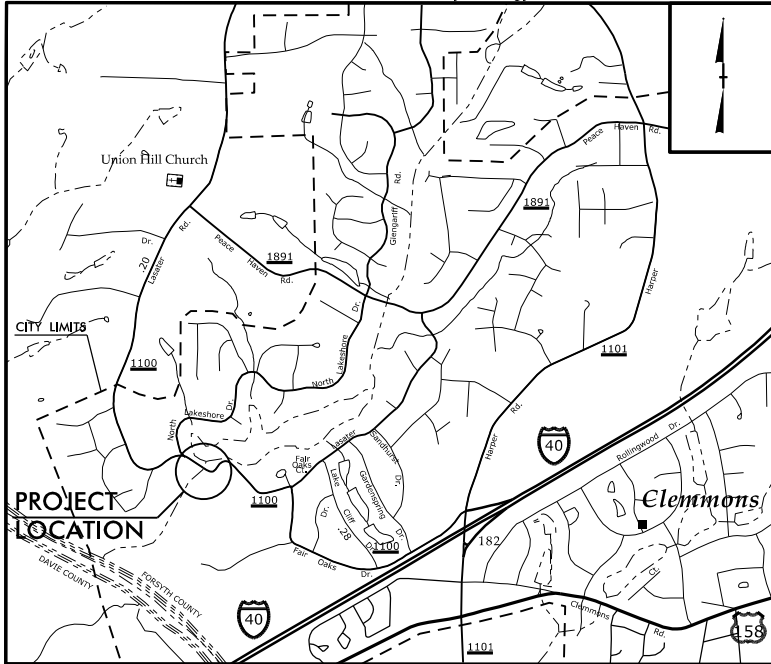
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User: rdw

TIP PROJECT: B-5152

CONTRACT:

See Sheet 1A-1 for Index of Sheets  
See Sheet 1B for Sheet Symbology



VICINITY MAP  
(NOT TO SCALE)

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

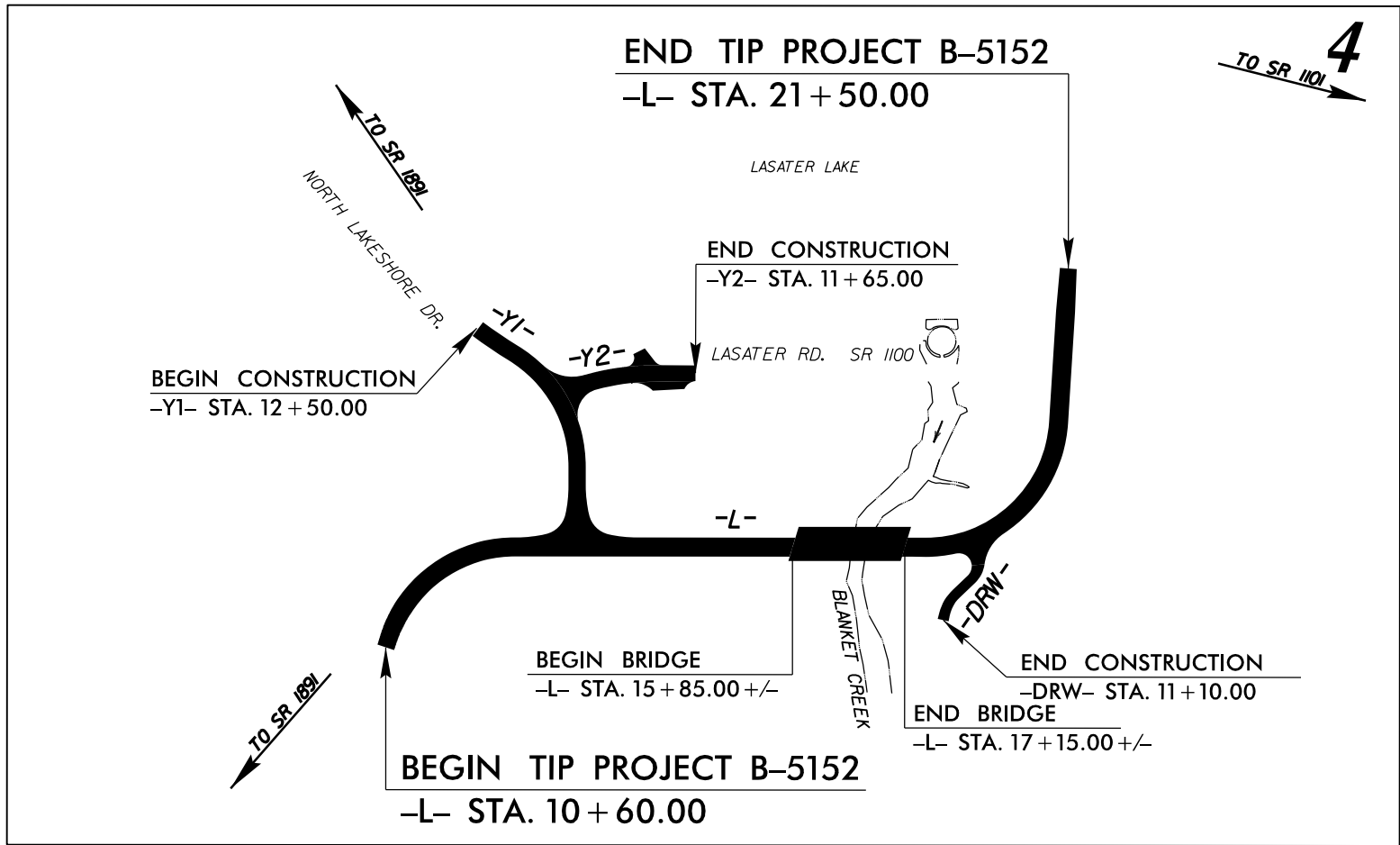
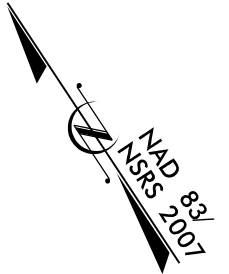
**FORSYTH COUNTY**

LOCATION: BRIDGE NO. 95 OVER BLANKET CREEK ON SR 1100

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

25% APPROVED PLANS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5152	3	6
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42313.1.1	BRZ-1100(23)	P.E.	



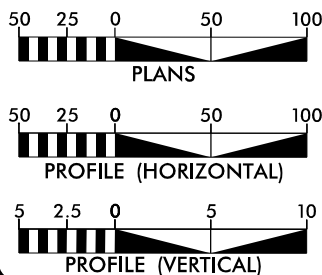
THIS PROJECT IS WITHIN THE MUNICIPAL  
BOUNDARIES OF THE VILLAGE OF CLEMMONS

THERE IS NO CONTROL OF ACCESS ON THIS PROJECT

INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2018 = 1340  
ADT 2038 = 1580  
K = 13 %  
D = 70 %  
T = 3 %  
V = 25 MPH  
(TTST = 1% + DUAL = 2%)  
FUNC CLASS =  
LOCAL RURAL  
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT B-5152 = 0.182 MILES  
LENGTH STRUCTURES STATE PROJECT B-5152 = 0.025 MILES  
TOTAL LENGTH STATE PROJECT B-5152 = 0.207 MILES



Prepared In the Office of:  
HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St., Suite 900 Raleigh, NC 27601  
N.C.B.E.L.S. License Number: F-0116

RIGHT OF WAY DATE:  
JANUARY 20, 2017

LETTING DATE:  
JANUARY 16, 2018

PHILLIP E. ROGERS, P.E.  
PROJECT ENGINEER

ANTHONY G. THOMPSON, P.E.  
PROJECT DESIGN ENGINEER

REKHA PATEL, P.E.  
NCDOT CONTACT

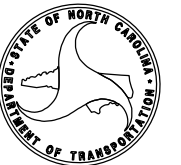
HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN  
ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA





PAT McCrory  
Governor  
NICHOLAS J. TENNYSON  
Secretary

August 30, 2016

STATE PROJECT: 42313.1.1 (B-5152)  
FEDERAL PROJECT: BRZ-1100(23)  
COUNTY: Forsyth  
DESCRIPTION: Bridge No. 95 over Blanket Creek on SR 1100 (Lasater Rd.)

SUBJECT: Geotechnical Report—Inventory

This report presents the findings for the proposed roadway in conjunction with bridge No. 95 in Forsyth County. The bridge is to be relocated approximately 200 feet downstream (south) of the existing structure requiring a realignment of the 2 lane roadway connecting North Lakeshore Drive to Lasater Rd.

The geotechnical field investigation was conducted in the month of August 2016. An ATV mounted CME 550 drill machine with automatic hammer was utilized to perform 4 test borings along the proposed roadway realignment. Additionally, two vane shear tests were performed in the soft alluvial soils of the Blanket Creek floodplain. The following survey lines are addressed in this report.

Line	Station
-L-	10+60 to 21+50
-Y1-	10+00 to 12+50
-Y2-	10+00 to 11+65

Physiography / Geology:

This project is located in southwestern Forsyth County within the city limits of Clemmons. The area is surrounded by residential communities and wooded areas. Lasater Lake lies just to the north and drains into the Yadkin River south of the project area by way of Blanket Creek. Topography is flat to gently sloping with local elevations ranging between 675 and 710 feet.

Geologically the site lies within the Charlotte Belt with residual soil types derived from metamorphosed mafic rock types of Paleozoic Era (PzZm).

Areas of Special Geotechnical Interest:

- 1) *Groundwater:* Groundwater was encountered in all four borings, but static groundwater measurements were only taken in three. In all instances groundwater is more than 5 feet below proposed grade. However, it is worth noting that the water table within the Blanket Creek floodplain appears to lie within 2 feet of ground surface.
- 2) *Alluvial Soils:* The Blanket Creek floodplain is rather extensive and bisects the project between approximate – L- stations 14+25 and 16+90. Alluvial soils consist of soft clayey sandy silt (A-4) with some organics and

very loose to loose silty clayey sand (A-2). Soil moisture content was noted to be 43.9% in the (A-4) strata at boring station 15+05, 17’RT –L-.

- 3) *Crystalline Rock / Weathered Rock:* Crystalline rock was not encountered during the course of this investigation. Weathered rock was noted at depth in two borings well below proposed grade.

Soil Properties:

- 1) *Fill Soils:* Roadway embankment fill soils are present beneath the existing roads. No boring data was obtained in existing roadway fill, however these soils appear well drained, stable, and are likely a combination of regional sands, silts and clays.
- 2) *Alluvial Soils:* Alluvial soils originate from water transportation and deposition in a floodplain environment. Alluvial deposits associated with this project were primarily encountered in the Blanket Creek floodplain at depths up to 11.1 feet. Alluvial soil types are described as soft, moist, clayey sandy silt (A-4) with some organics, and very loose to loose, moist to wet, silty clayey sand (A-2-4, A-2-6).
- 3) *Residual Soils:* These soils are derived from in place weathering of parent materials. They occur in a variety of consistencies, classifications, and stratigraphic sequences. Residual soils are further subdivided into clays, silts, and sands.

Clays are common soils within this region. They are found as surface soils and sub-soils. Clays specific to this site are described as stiff to hard, moist, silty sandy clay in the (A-7-5) AASHTO classification. Within the project corridor clay soils appear well drained and are medium plastic.

Silts are also common to the area and consist of soft to hard, moist, clayey sandy silt with the AASHTO classification of (A-4). Silts occur both near surface and at depth.

Sands may be found throughout the soil column as loose to very dense, moist, silty clayey sand in the (A-2-6) AASHTO classification.

Rock Properties:

- 1) *Weathered Rock:* Crystalline weathered rock was encountered in 2 boring locations. Weathered rock is defined as material exhibiting characteristics of the parent rock with SPT N-values of at least 100 blows per foot. Depth to weathered rock varied in each boring from 9 feet to 24 feet. No hard crystalline rock was encountered during our investigation.

Groundwater Properties:

Groundwater levels were measured immediately after drilling and again after a minimal 24 hour period to establish the static groundwater table. In some cases a static groundwater measurement may not be possible due to safety concerns.

For this project three of our four borings had static groundwater measurements. Depths to groundwater ranged from 2 to 6.1 feet.

**Undisturbed Samples:**

An undisturbed Shelby Tube sample was obtained from boring location at –L- station 15+05, 17’ RT. Sample analysis was performed at the NCDOT Materials and Tests Unit.

Respectfully Submitted,

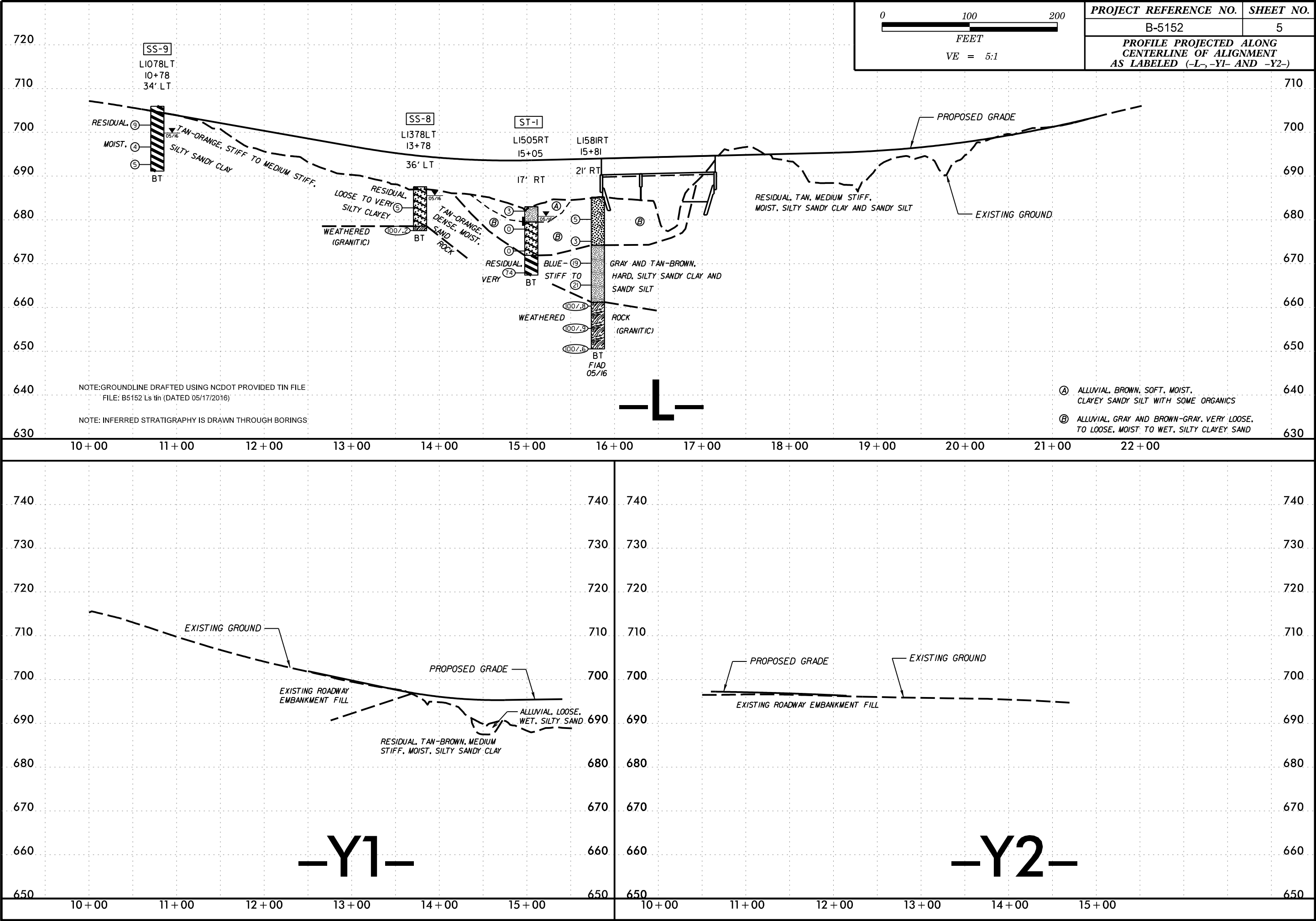
J. E. Beverly  
Project Engineering Geologist

DocuSigned by:

*J. Eddie Beverly*

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## LABORATORY TESTING SUMMARY

**PROJECT NUMBER:** 42313.1.1

**ID (TIP):** B-5152

COUNTY: FORSYTH

**DESCRIPTION:** REPLACE BRIDGE NO. 95 OVER BLANKET CREEK ON SR 1100

[illegible]